

Useful Strategies in Dealing with Transfusion Therapy

IT IS ESTIMATED that more than eight million units of blood and blood products are used in this country each year. Judging from this volume of activity alone, it is inescapable that the clinical use of blood and blood products represents an important therapeutic modality.

Human blood constitutes a national resource since it meets the criterion of a resource whose availability is restricted, being dependent on the motivation and participation of a limited population of human donors. The efficient operation of a transfusion service which utilizes this blood resource involves a fine balance between the regional input or supply of blood and the output or clinical use of blood. The physician, who controls one side of this equation, has a dual responsibility when he orders and uses blood and blood products. His primary responsibility is to assure safe and effective therapy for his patient. But if he fails to meet this obligation, either because of unnecessary use of blood or the use of an inappropriate component, he may act to deplete the regional blood reserves and may, in effect, deny the availability of blood to some other patient. These are not idle theoretical speculations. In the face of current demand, the supply of blood can only be described as marginal, and we have witnessed repeated episodes of blood shortages in different areas of the country which have necessitated the cancellation of elective surgical procedures.

The interplay of social, moral and ethical problems associated with the procurement of blood may in some situations complicate the straight-

forward application of transfusion therapy to clinical medicine. To cite an example, it is now recognized that the buying and selling of blood has more tangible consequences than just the moral implications of such a practice. It has been repeatedly documented that blood from paid donors carries a significant risk of hepatitis for the recipient.

The physician should be aware of the three basic elements affecting the operation of a blood transfusion service, even though he may not always be in a position to affect all these elements. First, there is the large problem of obtaining blood, which involves the recruitment of sufficient donors to maintain a predictable and steady supply of blood to meet clinical needs. Obviously this is not the place to consider this aspect, although it is difficult to see how the physician can long remain unaware and unconcerned about the availability of blood. Second, there is the need to utilize the blood efficiently after it has been obtained from the donor. Appropriate responses to this need involve: the more efficient control of blood resources by regionalization of blood banks, efforts to manipulate blood inventories with the help of computer technology so as to minimize outdating and exercise control over blood input, and efforts to develop blood preservation techniques which will extend the shelf-life of blood and blood components. Finally, the physician directly impinges on the system through his use of blood. He has an obligation to keep current with developments in transfusion therapy so that he can utilize the safest and most effective blood component in treating his patient. Through the use of component therapy, the physician is able to achieve more effective therapeutic levels of the desired component, and to extend the available blood resources since each unit of whole blood can meet the needs of multiple recipients.

For reasons not entirely clear, blood banking and immunohematology have been neglected areas in clinical medicine. There is a need to attract and develop a specialized cadre of medical manpower

that will extend and promote high quality care in this area of clinical medicine. In part this deficiency may have been due to the impression in the past that the blood bank was essentially a "supermarket" type of operation serving solely as a repository for blood.

The review of current transfusion therapy by Hinkes and Steffen in this issue of *CALIFORNIA MEDICINE* clearly shows that we have come a long way from the era when blood was used to correct anemia and traumatic or surgical hemorrhage. Current transfusion therapy is a complex and sophisticated discipline that deserves the serious consideration of the clinician. Immunohematology and the clinical use of blood have expanded rapidly since World War II and have benefited from major advances in hematology, immunology, biochemistry, cardiology, genetics, and technology such as plastic bags and the refrigerated centrifuge. Hinkes and Steffen have tried to show that the clinician needs to be aware of the rapid advances in blood banking if he is to provide the safest and most effective transfusion therapy. The proper use of blood requires: a knowledge of the pathophysiology of the condition being treated, identification of the specific deficiency in the patient, and the choice of the appropriate product. Their review provides a useful discussion of the large number of products currently available for transfusion therapy, deals with some aspects of blood storage and summarizes the available information on transfusion-transmitted hepatitis which constitutes a major risk in transfusion therapy. Probably, because of space limitations, they do not discuss exchange transfusions used in pediatric practice for treatment of hemolytic disease of the newborn due to feto-maternal blood group incompatibility, nor do they discuss the use of blood in extracorporeal or cardiac-bypass shunts.¹ It should also be emphasized that hepatitis is not the only risk or hazard associated with the use of blood. Some of these reactions such as the immediate hemolytic transfusion reaction or the use of blood contaminated with cold growing Gram negative organisms can be as life-threatening as hepatitis.^{2,3}

There are a number of topics in blood banking in which there is no unanimity of opinion at our current state of knowledge. One of these topics is the role of frozen blood in a transfusion service. Hinkes and Steffen have tried to present a balanced viewpoint and have enumerated the advantages and disadvantages of this product. The

advantages of frozen blood enumerated by them have to be balanced against the current high cost of frozen blood. If the advantages of frozen blood were absolute and not attainable by other means, there would be no hesitation in promoting the adoption and use of frozen blood. But as Chaplin⁴ has indicated, many of the advantages of frozen blood are relative and not absolute. For example, the very long shelf-life of frozen blood permits the stockpiling of blood so that a dependable supply can be kept on hand. Blood shortages, however, could also be avoided with liquid preservation of blood if efforts were directed to a more efficient use and control of donor recruitment, and by promoting the use of preservatives such as adenine which can extend the shelf-life of blood. Similarly the advantages of reduced hepatitis infectivity and the low incidence of immunization to HL-A antigens in potential organ transplant recipients, may be attainable with liquid stored blood by using more sophisticated epidemiological and laboratory detection techniques for hepatitis carriers and through the improvement of the techniques currently in use for preparation of buffy coat-poor blood. This is not to say that frozen blood is not an essential part of current transfusion therapy. Frozen blood has an established role in stockpiling rare blood types for later autologous or homologous transfusions. Overall, it does not appear to this reviewer that the across the board adoption of frozen blood programs in blood banks throughout the country is justifiable at this time.

On balance, Hinkes and Steffen should be commended for putting together an extremely useful review of transfusion therapy and for highlighting the large variety of problems that can be handled with the knowledgeable use of blood. It is to be hoped that physicians will take the time to familiarize themselves with this rapidly expanding field so that they can make available to their patients the best quality of care in this therapeutic modality.

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